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THE LOCUST PEST IN MALAYA. A SHORT SURVEY AND A BRIEF DESCRIPTION OF ITS LIFE HISTORY.

By H. C. Pratt.

The life history and general habits of the locust now present in this country is completed and it is intended to issue a special bulletin from this Department dealing with this insect embodying methods of controlling its increase. As it is necessary to await the arrival of the blocks for the illustrations some delay will be caused and it is thought that, pending this publication, a short survey of the locust pest and a very brief description of the life history of this insect will be of value and interest to many people in this country.

It will be realized that before spending a large sum of money on an organised campaign which has now been started by the Chief Agricultural Inspector and myself, it was essential, in order to combat this pest that an efficient means of dealing with it should be found. With this object in view six weeks were spent in Seremban with experimental work. During this period an average of five coolies per day were employed and rather more than 1000 kerosene tins of hoppers were destroyed. Of the several methods tried that which I eventually selected was a driving and trap system, while the success which has attended its use may be gathered from the report on the Progress of the Locust Work published in this present issue by Mr. South. One of the best guarantees of its success is the fact that the Malays in a certain part of Selangor have copied the apparatus in order to catch the hoppers and obtain the Government reward, and in order to induce a Malay to work it is usually necessary that he should perceive in the future more remuneration than his exertions entitle him to expect,

The occurrence of the locust pest in this country is attended with some interesting features. It first appeared about 20 months ago in the neighbourhood of Port Dickson and since that time, it has spread, mostly in a northerly direction over 100 miles of this country. At the same time it has greatly increased while the breeding grounds are now distributed over the whole line of its extended range, which as might be expected is largely confined to the Railways, and Roads. That the part where this pest first occurred is the most suited to it cannot be regarded as a point in favour of its being an indigenous species. There are in Malaya many other large districts which provide far more suitable areas over which this insect could breed and which are covered with a greater abundance of those foods to which the locust is partial. That this is true has been emphasised by the rapidity with which the swarms increased in the mining lands of Selangor where during the past month immense swarms of hoppers have been destroyed.

In searching for the origin of this insect in this country one is handicapped by the fact that reliable written records are absent. Vague rumours of locusts many years ago are by no means lacking. Destruction of rice crops is also attributed to them, but beyond these traditions no sound information is extant, and the investigation leaves but a hazy impression of what insect really occurred in these earlier years. It would seem that any effect likely to produce a sudden increase of an indigenous locust would hardly be confined to the small locality in which they first appeared, and would be traceable to some definite cause, as for instance weather, in which case the effect upon the increase of the insect would be more general. It would however be premature to draw any conclusion on this subject. Port Dickson has but a small external trade, and it is unlikely, yet possible, that it was introduced here.

Summary of Life History.

The eggs of locusts are laid in masses in burrows beneath the ground. These burrows are formed by the females, and they deposit in each about 40 eggs, sometimes more sometimes less. The softer soils are usually chosen for this operation which takes several hours to complete. Surrounding each egg mass, as also each egg, there is a spongy glittering substance which acts as a protection to the eggs, prevents an excess of moisture, and keeps clear the hole at the surface of the ground through which the insect ultimately escapes.

Thirteen to fourteen days after the egg has been deposited in the ground the small hopper appears. At first it is fleshy coloured but this quickly changes and becomes black with an indistinct

white stripe on the upper side of the abdomen. In from 24 to 29 days, during which time there are five moults, the winged insect appears, thus from the date on which the eggs are laid 37-44 days elapse before the insect is adult or in the flying stage, and in this state they do not live more than approximately 3 months.

The habits of the hoppers in all their stages are very similar. After issuing from the burrows they are quiet and if there is plenty of suitable food they do not as a rule leave the breeding ground. These very young ones do not generally progress very far in the course of one day. They show their gregarious instinct from the beginning collecting together at night fall or during wet weather. They are in fact sun-loving insects, and it is during the brightest hours of the day that their greatest activity is shown. They congregate in dense masses on stones or places exposed to the heat of the sun, and this love of warmth accounts for their annoying habit of settling on Railway lines.

Four or five days after hatching the first skin is cast, the insect becoming much larger, as is the case after each succeeding moult through which it passes. Before each skin is cast it is their habit to stop feeding. When the ecdysis takes place they climb any near support and hang head downwards. Very soon the skin bursts over the head and thorax and the new instar wriggles through the opening, hangs for a short while attached to the cast skin and then falls to the ground. At first it is in a very soft condition but this rapidly changes and the insect again commences to feed with greater voraciousness than before occasioned by its enforced abstinence. As they become older, and larger, they consume more food and are capable of traversing a greater distance in one day. Their activity commences about 8 a.m. when the dew is off the ground and continues with unabated energy until about 5 p.m. when they will assemble, climb the stalks of grass or other supports and rest till day break. When marching in an army and not hungry they will climb fences and trees and the sides of houses, sometimes entering the latter much to the annoyance of the inmates. Native food which is being cooked in the open air, and incautiously left uncovered is soon filled with bodies of hoppers, while that displayed in Kedehs is often covered with a mass of these creatures.

They are by nature cannibalistic devouring with avidity the dead bodies of their companions and often consuming those which are in the helpless condition of moulting. With swarms of hoppers on roads, some of which are killed when a motor car passes, the cannibalistic habit is well shown. It takes but a few minutes for the living insects to assemble and commence feeding upon the

dead hoppers and thus outlining the track of the car by reason of the dense masses of these insects.

As the hoppers become older they migrate from place to place in armies devouring the vegetation as they pass over the ground. Their tracks may be followed by the brown wastes which they have left behind them. Many of their food plants have been described in the last number of this bulletin, and their ability to swim across water was remarked upon.

After passing 5 to 6 days in the 5th hopping stage the last skin is cast and the fully fledged insect appears. The wings, as is the case with the body, are at first a milky white, and the whole insect is so soft as to be incapable of any quick movement. For several days the fliers do not move very far as they are unable to fly with any vigour. Some three or four days after wings are acquired especially if food is not abundant they commence to fly away and will pick up other swarms in other localities, or join larger flights. Thus a swarm is considerably augmented in the course of a few weeks, and although the small nature of many swarms makes them individually of but little importance collectively they become a matter for more serious consideration.

When the major part of the females of a swarm are about to lay eggs they will settle on the ground and attempts to drive them away will prove fruitless. Such swarms usually fly low on account of the gravid condition of the female which after settling crawls over the ground accompanied by a male. Oviposition does not take place immediately the swarm alights. With those swarms which have been observed in this country the first deposition of eggs in any quantity occurs the day after a swarm has settled for the purpose of perpetuating their kind, and this is most actively accomplished on the second day. In most cases there is but little sign of the swarm on the third day, many having died, while the rest have moved away.

As has been mentioned the swarms which from time to time fly over parts of this country are the result in most cases of a combination of small swarms which joining together form immense numbers of these insects. It is when in such numbers that the migratory instinct is more in evidence. There are probably many factors which play a considerable part in this habit of migration and such influences may vary in their importance. They are as a whole imperfectly understood but the chief causes may be attributed to excessive multiplication and to instinct. In the species occurring in this country the migratory instinct is not strongly developed, and it is probable that through the action of the Government to rid this country of the pest they have been checked multiplying

in such excessive numbers as to render long migrations in search of food and fresh breeding grounds essential to their existence.

Young fliers are very much more active than those composing older swarms, and they also fly at a greater height. Records show that some swarms fly at the immense height of 16,000 feet which would render them quite invisible to the naked eye from sea level. Such locusts breed very largely in the high hills in a dry rarified atmosphere and this as has been suggested probably acts as an incentive for them to fly at a great height. It is not possible to deal effectively with a swarm of fliers. The stage in which locusts are most easily attacked is during their hopping life. The method which has been found successful was described in the last bulletin, and it is hoped that some supplementary methods which might be employed by planters willing to assist the Department and who are unable to obtain this apparatus will be incorporated in the next bulletin.

THE QUALITY OF THE PLANTATION RUBBER TREE.

By E. Bateson.

A valuable result of the investigations of the Akers commission which has not hitherto been published in English is the light thrown by one of the members, Dr. Jacques Huber, on the question whether the rubber tree of our eastern plantations is the genuine *Hevea brasiliensis,* which in the Amazons produces the best quality of rubber. Dr. Huber, who is a well-known authority on Para rubber, was the botanist of the commission. To him fell the duty of studying the plantation industry from the botanical point of view, and his observations on the subject are set forth in a special report presented to the Governor of the State of Para. A copy of this report has been received by the Director of Agriculture, F. M. S., and it discloses facts of such moment to all interested in plantation rubber that they deserve to be given the widest publicity.

The suggestion that the trees introduced into the East belonged to some species other than *Hevea brasiliensis,* or to an inferior variety of that species, was made originally by Amando Mendes. It was based on two assumptions, namely, that plantation rubber is inferior to the best Brazilian rubber, and that the district in which Wickham was said to have collected his seeds yields rubber of a poor quality.

The task of verifying or disproving this suggestion was taken up by Dr. Huber, and was prosecuted in a most thorough manner,

He confirmed by independent inquiries Wickham's statement as to the locality where he obtained his seeds; he made a careful study of the species and varieties of *Hevea* occurring in that locality; and, finally, he determined whether any of these species and varieties, other than the true *Hevea brasiliensis,* were present among the trees in eastern plantations.

To the west of the lower Tapajos is a jungle-covered plain extending to the river Madeira. One of the rubber producing centres in this plain is near the river Arapium, and it was here, according to the evidence of an old inhabitant, that Wickham made his collection of seeds.

A careful search of this district resulted in four kinds of rubber tree being found. The first was a variety of *Hevea brasiliensis* which seemed to be similar in all respects to that found in the estuary of the Amazon as far as the high Purus; that is to say, it is the variety which yields fine hard Para. Its leaflets were obovate and tapered to a sharp point at the apex. The second was another variety of *Hevea brasiliensis,* with lanceolate leaflets ending in a rather dull point. This variety is thought by the natives to give rubber of a slightly inferior quality. The third was a species of *Euhevea,* probably identical with *Hevea collina,* which was originally described by Dr. Huber. It is easily distinguished from *Hevea brasiliensis* by its leaflets, which are violet in colour at the base and are somewhat different in shape. The rubber obtained from it is not equal to fine hard Para. The fourth was *Hevea Spruceana,* but this species need not be taken into account, as it grows in low places on the banks of lakes, and Wickham's collection was made on dry elevated land. Also, its seeds are so unlike those of *Hevea brasiliensis* that no confusion is possible.

With regard to the two kinds of *Hevea brasiliensis,* Dr. Huber is very doubtful whether there is any justification for describing them as distinct varieties. Slight differences in the form of the leaf are not sufficient to go upon, as such a character may be very variable; and he has, in fact, often seen both types of leaf on the same tree. He thinks, therefore, that the difference in shape is nothing more than a simple individual variation.

This conclusion, which is perfectly reasonable, leaves no ground for the supposition that the variety of *Hevea brasiliensis* occurring in the lower Tapajos valley is inferior in any way to the best variety known. The inferiority of the rubber from that region can be otherwise explained, and Dr. Huber says it is not at all unlikely that the quality of proper "strong rubber" is slightly influenced by occasional additions of the latex of *Hevea collina.*

At this stage of the investigation, then, the matter stood as follows. The forests which are the ancestral home of the plantation rubber tree contain two species of *Hevea*. One, *H. brasiliensis*, is the species witch yields the finest quality of Brazilian rubber, and from the other, *H. collina*, an inferior grade of rubber is obtained. Did Wickham's collection consist entirely of seeds belonging to the former species, or were some seeds of the latter also included?

Dr. Huber's visit to the East gave him an opportunity of answering this question. He took special care in inspecting the veteran trees in the gardens of Heneratgoda, Peradeniya, Singapore and Buitenzorg, and although they were not in flower at the time he was able to make certain, from the characters of the leaf, that there were no specimens of *Hevea collina* among them.

But of the original trees, which numbered about two thousand, only about sixty are now alive, and it was possible that some of the non-survivors belonged to the species *collina*. In that case their offspring would be found in rubber estates, mingled in smaller or greater numbers with trees of *Hevea brasiliensis*.

It was therefore necessary to pursue a more extended search, and describing the result Dr. Huber says:—"Among all the thousands of trees which I examined during my travels through the plantations of Ceylon, Malaya, Sumatra and Java, I could not discover a single one that possessed the characters of *Hevea collina*. My conviction is, therefore, that *Hevea collina* (at least as a species) is not represented in the rubber estates of the East." No hybrid between *H. brasiliensis* and *H. collina* is known in Brazil, and Dr. Huber apparently saw nothing to lead him to suspect the existence of such a form among trees in cultivation.

Dr. Huber alludes to the fact that since Wickham's consignment no seeds or plants of *Hevea* have been imported into the East from Brazil. This is certainly an important point. It means that the number of species or varieties which might have been introduced is limited to those occurring in the lower part of the valley of the Tapajos, and, as we have seen, it has been proved that none of these was brought to the East except the true *Hevea brasiliensis*.

Thus the ingenious hypothesis of Amando Mendes is shown to be utterly without foundation. The proof is all the more conclusive because it has come from the other side. There is no doubt that the Brazilian government would have welcomed a different issue, and they probably entertained hopes of dealing a severe blow to their powerful rival in the Middle East. Therefore, although the research was carried through and the result expressed with strict scientific impartiality, the personal element, if it could have

entered into the question at all, would undoubtedly have told in favour of Brazil. Dr. Huber's investigation, however, has ended in a complete vindication of the high quality of the plantation rubber tree, and the matter may be considered settled once and for all.

Two points now remain for chemists to determine: first, whether the latex from young trees is inferior to that from older trees; and secondly, whether the different methods of treating latex employed here and in Brazil affect the quality of the finished product. The settling of the first point might possibly prove the necessity of grading; and the determination of the second, with the adoption of a uniform (and, if necessary, improved) method of manufacture on all estates, would speedily lead to the abolition of the present disparity in price between fine hard Para and the highest class of plantation rubber.

ADDITIONS TO MYCOLOGIC FLORA OF MALAYA.

By A. Sharples.

The following fungi have been gathered and identified during the last few months, and are given as additions to the list published by Bancroft* in a previous issue. Further additions will be made as opportunity permits.

Cookeina Tricholoma.

The characters of the genus are given as follow:—

Plants stipitate or sub-stipitate, bright colored, some shade of red or yellow, hairy or pruinose; hairs when present fasciculate; substance tough, not shrinking much in drying; aasci 8 spored; spores hyaline or sub-hyaline, ellipsoid to fuscoid usually striate, striation consisting of light and dark bands extending lengthwise of the spore; paraphyses present, filiform.

The type species is Cookeina Tricholoma. The specimens were gathered during a recent visit to Bentong.

The following description is taken from Mycologia Vol. V, July 1913, No. 4.

Cookeina Tricholoma, (Mont), O. Kuntz

Synonyms:—Peziza Tricholoma, (Mont).
Peziza Hystrix, (Berk).
Trichoscypha Tricholoma, (Sacc).

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* Agricultural Bulletin of the Federated Malay States No. 7.

Pilocratera Tricholoma, (P. Henn).
Peziza striispora, (Ellis & Er.)
Sarcoscypha striispora, (Sacc).

Plants stipitate, cup shaped, with margin slightly incurved, 1-1·5 cm. diameter and about 1 cm. deep; stem often so short as to appear sessile, or 2-3 cm. long: exterior of the cup and stem entirely clothed with long hairs, which are more numerous around the margin, forming an incurved border; entire plant deep red, or nearly scarlet: axis cylindric, 350-375 × 20 microns, abrubtly extended below into a short appendage like base: spores ellipsoid to fusoid, about 27-33 × 12 14 microns, hyaline or sub-hyaline with one or two large oil drops, and granular within, usually marked with delicate, longitudinal striations; paraphyses filiform, slender, slightly enlarged upwards.

On old wood and bark.

From West Bentong—Pahang.

The species gathered were quite typical, and conformed absolutely with the above description.

Polyporus spongia, (Fr.).

Caespitose, much divided; pilei 3-6 inches across, spongy, soft, numerous, dimidiate, strigoso-velvety, ferruginous brown, when dry becoming sulphur yellow; flesh about ½ inch thick, bright brown: margin thin, incurved, soft, pores short, about ¼ inch in length: rather small, entire, sulphur coloured: spores elliptical, smooth, white.

Found at the base of a dead stump, Kuala Lumpur.

This specimen agrees with the typical description, excepting for a slight difference in the colour of the spores, which is given, in the type, as very pale yellow, almost colourless. The difference in colour of the specimen when dry is also noteworthy; in the specimens described, the dried fungus takes on a sulphur yellow colour, in the type, an orange brown coloration. These differences are not sufficient to justify any separation of this specimen as a variety of the type form.

A yellow brown colouring matter is present, soluble in methylated spirit.

Calocera stricta, (Fr.).

Simple, solitary, ½-1 inch high, linear, even when dry, yellow: base abrupt encircled with a white tomentum.

Occurring very commonly on newly opened rubber plantations on dead wood etc.

GASTROMYCETES.

FAMILY—NIDULARIACEAE.

Genus-Cyathus.

Cyathus striatus, (Hoffm.).

Obconic, apex truncate, at first covered by a pale epiphragm, lead coloured and striate within, outside hirto-tomentose, brownish: peridiola subcircular, compressed 2 mm. across: spores elliptic oblong, colourless, smooth 18-22 × 10 microns.

Found growing on a laterite path, upon bits of damp wood. The fluted inside of the peridium was quite characteristic.

WORK ON LOCUST DESTRUCTION IN SEPTEMBER.

BY F. W. SOUTH.

The information contained in this article is mainly summarised from the reports of the Assistant Agricultural Inspectors in Negri Sembilan and Selangor for the month under consideration, and from the fortnightly reports of the Special Assistants working under them in the various districts as well as from personal observations by the writer. The scheme in accordance with which the work is being carried on was briefly outlined in the last number of the *Agricultural Bulletin.*

CENTRES OF WORK IN SELANGOR.

As was stated in the previous article referred to above, there were three main centres of distribution of hopping locusts in Selangor. The most northerly and therefore the most important comprised a large portion of the district of Ulu Selangor. The locust swarms there were numerous between Rawang and Kuala Kubu and were receiving special attention as it was hoped that their further spread north might be prevented. South of Rawang there were practically no swarms until the neighbourhood of Kuala Lumpur was reached when they again became very numerous especially in the plain running from under the hills round Batu Caves past Setapak village and under the Rifle Range to the Race Course. In this plain from two to four gangs of coolies were at work during the whole month. From Kuala Lumpur southwards swarms were to be found scattered over the district to points some few miles beyond Kajang; while westward they extended along the Petaling road as far as Batu Tiga. The neighbourhood of Kuala Lumpur was thus a second important centre, and the third was the district between Kuala Lumpur and Kajang. In each of these three districts a Special Assistant was posted, though the officer in charge at Kajang was not moved there until September 20th as he had first to make arrangements to commence work in

his own district of Seremban and Jelebu when the hoppers should have commenced to hatch out there.

Results. In the earlier part of the month 1 or 2 gangs only were employed by each Special Assistant in Selangor, but as fresh supplies of apparatus were obtained, and as all of it that was not required in Negri Sembilan was sent to Selangor, the number of gangs at work under each officer was increased to three or four. As a result of the month's work 5322 kerosene tins full of hoppers in all stages from the 2nd to the 5th were destroyed. This quantity represented 104 swarms. In addition 2083 kerosene tins full of hoppers were reported to have been captured by the Malays in the Kuala Kubu district working independently with their own apparatus which was copied more or less from that used by the Department.

The Position in Negri Sembilan.

Flying swarms of locusts occurred in numbers in the Seremban and Jelebu districts which form one centre of work and in the Tampin and Kuala Pilah districts which form a second centre. At the end of the month two breeding grounds and one swarm of hoppers had been reported in the Tampin district. As there was no destruction work required in the Seremban centre the Special Assistant there with his trained conductors and some apparatus was transferred to Kajang, as has been stated. The officer in the Tampin district was kept there to make observations on the flying swarms.

In the Coast district numerous quite small swarms occurred and the Special Assistant in charge there with one gang of labourers had destroyed 42 swarms amounting to 62¾ tins of hoppers in all stages from 2nd to the 5th by September 27th. He was somewhat handicapped by the difficulty of obtaining Malay labour and by the nature of the country.

Apparatus Supplied.

The deficiency in the amount of apparatus owing to lack of local material has constituted a severe handicap on the work throughout, though small quantities continued to be delivered during the month. At the time of writing, October 15, some 500 yards more sheeting is available and it is hoped that after the next six weeks 3,000 or 4,000 yards more will have been delivered or will be in course of construction. This should leave a certain quantity at the disposal of any planters who are willing to assist the Department by carrying out the work on their own estates themselves.

Damage Inflicted.

Taking the numbers of locusts into consideration the damage caused by them has not been very serious. On one estate 25 young rubber trees were broken by the weight of some recently matured flying insects which settled on them. In a few places coconut palm leaves have been badly eaten, and patches of padi have been destroyed; but much of the feeding of the hoppers has been confined to open mining country, where the temporary check to the lalang and other grasses cannot be regarded as of much importance. The damage to private gardens too is mostly of a temporary nature and lawns and bamboo hedges though rendered unsightly for a time should quickly recover in the rains that are at present of almost daily occurrence.

Present Position.

In the immediate neighbourhood of Kuala Lumpur especially in the plain on the Ampang side already referred to, most of the swarms of hoppers present during September have now, Oct. 15, been destroyed or arrived at maturity. The remainder round Kuala Lumpur and in the other districts will either have been destroyed or have reached maturity in the course of the next three weeks. One or two swarms of hoppers belonging to what may be considered an intermediate generation may remain, but the majority of the insects that occur will be flying and work will have to be greatly reduced.

In Negri Sembilan on the other hand the generation of locusts now present is in the flying stage, except in the Coast district, but it is anticipated that a generation of hoppers will soon make its appearance. It is hoped, and even more, expected, that the appearance of this generation in Negri Sembilan will synchronise with that of the flying generation in Selangor, as this will enable most of the available staff and the bulk of the apparatus to be concentrated in Negri Sembilan. It is this periodicity definite, though slightly blurred, combined with the scattered nature of the swarms which prevents work from being carried on all over the country at the same time; while it also conveys a false impression of the absence of locusts to the public.

In reviewing the situation at the present time, it is safe to state that the number of flying locusts that will escape from the destruction of the present generation of hoppers in Selangor, will be no larger, even if as large as that which was contained in the previous generation of fliers from which these hoppers arose. This is equivalent to saying that there will have been no increase in the number of locust present in this generation in Selangor over that present three months ago. When it is considered that the staff

employed has only been at work one month and that in that time numerous small difficulties attendant on the commencement of any organisation have been overcome, while in addition the officers have been handicapped in their work by want of apparatus, it is impossible to avoid the optimistic conclusion that work on the next generation of hoppers should result in a large diminution in the numbers of locusts present in the country. This conclusion is strengthened by a consideration of the enormous increase which any observer well acquainted with the size and number of the swarms of hoppers in Selangor especially near Kuala Lumpur must confidently have expected had they all escaped unchecked.

The results in the Negri Sembilan are, as stated, confined to the Coast District and the general situation does not permit any conclusions to be drawn. It may, however, be stated that every effort will be made to destroy a large proportion of the generation of hoppers that is expected to appear soon, and thus materially to lower the number of insects present in the State.

MANURIAL EXPERIMENTS WITH YOUNG RUBBER AT KUALA LUMPUR.

Second Year's Result.

By F. G. Spring.

A description of these experiments was published in the *Agricultural Bulletin F. M. S.* Vol. I, p. 194, and the results for the first year were then given. It may be remembered that the land on which the tests were made is not ideal for manurial experiments. It was necessary to divide the plots into two sections, namely A and B, as there was not a sufficiently large area of one description of land to carry out the required number of experiments. The nature of the soil, as pointed out in the previous article, is laterite and would appear to be below the average as regards soil fertility. The manures were forked lightly in around the trees to a depth of two to three inches, between two circles of 1 and 4 feet radius, the tree being the centre of the circle. The land was weeded once in six weeks, the control plots being weeded as often and treated in a similar way to the manured.

The increase in girth over trees of the unmanured plots for the first year is as follows:—

Table A.

Plot.	Fertilizer added.	Increase in girth over trees of the unmanured plots.
2	Lime, Nitrogen	1·36 inches
4	Lime, Nitrogen, Potash	1·33 „
1	Lime, Nitrogen, Phosphate	1·87 „
5	Lime, Potash, Phosphate	1·87 „
3	Lime, Potash, Phosphate, Nitrogen	2·35 „

TABLE B.

9	Lime	1·05 inches
7	Lime, Potash	1·12 „
8	Lime, Phosphate	1·87 „
12	Phosphate, Potash, Nitrogen	1·48 „

The increase for the second year is as follows.

TABLE A.

Plot.	Fertilizer added.	Increase in girth over trees of the unmanured plots.
2	Lime, Nitrogen	0·19 inches
4	Lime, Nitrogen, Potash	0·04 „
1	Lime, Nitrogen, Phosphate	0·28 „
5	Lime, Potash, Phosphate	0·51 „
3	Lime, Potash, Phosphate, Nitrogen	—0·01 „

TABLE B.

9	Lime	—0·58 inches
7	Lime, Potash	0.24 „
8	Lime, Phosphate	0·26 „
12	Phosphate, Potash, Nitrogen	0·15 „

It should be understood that the land was manured on one occasion only, namely in the latter part of 1911. The results therefore show the effect of one application of manure over a period of two years.

During the first year, the trees in the manured plots, in every case, showed a good excess in girth measurement over the trees in the unmanured plots but during the period of the second year, the increase in girth measurements of the unmanured plots are almost equal to that of the plots in which manures were applied. It is evident, therefore, that in this particular soil, the manures had good effect for one year only. This is not surprising considering the lightness of the soil, and the periodical heavy tropical rainfalls it receives. Judging from the results it would be expected that small dressings of artificial manures, applied at frequent intervals, would be more effective and profitable than larger quantities applied at longer intervals.

One point of some interest is that during the first year the plot in which lime was applied alone (No. 9) gave comparatively good results but during the second year the girth measurements do not compare favourably even with that of the unmanured plot. This may be due to the lime having reduced, to some extent, the available supplies of nitrogen and potash. As pointed out by Mr. Barrowcliff in the last article published on these experiments "In future years however future additions of lime may be expected to have less effect than in this, the first one, but those of potash and nitrogen a correspondingly greater."

The plots are to be remanured shortly with similar dressings. The results for the third year will be published when available.

TABLE. A.

No. of trees in each Plot, 120.

No. of Plot.	Manure applied.	lbs. of Manure	Date of applying Manure.	Average girth 1 ft. from ground.			Increase in girth.	
							1st yr.	2nd yr.
1	Sulphate of Ammonia Double Superphosphate Lime	½ lb. per tree 1½ lbs. ,, ,, 1000 lbs. per acre	14th. Nov. 1911 16th. Nov. 1911 21st. Sept. 1911	2.35 inches Oct. 1911	7.00 inches Oct. 1912	11.05 inches Oct. 1913	4.65 inches	4.05 inches
2	Sulphate of Ammonia Lime	½ lb. per tree 1000 lbs. per acre	15th. Nov. 1911 21st. Sept. 1911	1.90 inches Oct. 1911	6.04 inches Oct. 1912	10.00 inches Oct. 1913	4.14 inches	3.96 inches
3	Sulphate of Ammonia Double Superphosphate Sulphate of Potash Lime	½ lb. per tree 1½ lbs. ,, ,, 1 ,, ,, ,, 1000 lbs. per acre	16th. Nov. 1911 18th. Nov. 1911 28th. Nov. 1911 28th. Nov. 1911	2.15 inches Oct. 1911	7.28 inches Oct. 1912	11.04 inches Oct. 1913	5.13 inches	3.76 inches
4	Sulphate of Ammonia Sulphate of Potash Lime	½ lb. per tree 1 ,, ,, ,, 1000 lbs. per acre	16th. Nov. 1911 28th. Nov. 1911 2nd. Oct. 1911	2.12 inches Oct. 1911	6.13 inches Oct. 1912	9.94 inches Oct. 1913	4.01 inches	3.81 inches
5	Double Superphosphate Sulphate of Potash Lime	1½ lbs. per tree 1 lb. ,, ,, 1000 lbs. per acre	18th. Nov. 1911 29th. Nov. 1911 2nd. Oct. 1911	2.01 inches Oct. 1911	6.66 inches Oct. 1912	10.94 inches Oct. 1913	4.65 inches	4.28 inches
6	No Manure			2.35 inches Oct. 1911	5.13 inches Oct. 1912	8.90 inches Oct. 1913	2.78 inches	3.77 inches

TABLE. B.

No.of trees in each Plot, 120.

No. of Plot.	Manure applied.	lbs. of Manure.	Date of applying Manure.	Average girth 1 ft. from ground.			Increase in girth.	
							1st yr.	2nd yr.
7	Sulphate of Potash Lime	1 lb. per tree 1000 lbs. per acre	29th Nov. 1911 6th Oct. 1911	2.96 inches Oct. 1911	7.77 inches Oct. 1912	11.63 inches Oct. 1913	4.81 inches	3.86 inches
8	Double Superphosphate Lime	1½ lbs. per tree 1000 lbs. per acre	19th Nov. 1911 9th Oct. 1911	2.44 inches Oct. 1911	8.00 inches Oct. 1912	11.88 inches Oct. 1913	5.56 inches	3.88 inches
9	Lime	1000 lbs. per acre	13th Oct. 1911	2.73 inches Oct. 1911	7.47 inches Oct. 1912	10.51 inches Oct. 1913	4.74 inches	3.04 inches
10	Perlis Guano	4 lbs. per tree	30th Nov. 1911	2 72 inches Oct. 1911	7 65 inches Oct. 1912	11.21 inches Oct. 1913	4.93 inches	3.56 inches
11	Bone Meal	3 lbs. per tree	30th Nov. 1911	3.11 inches Oct. 1911	8.47 inches Oct. 1912	12.79 inches Oct. 1913	5.36 inches	4.32 inches
12	Sulphate of Ammonia Double Superphosphate Sulphate of Potash	½ lb. per tree 1½ lbs. ,, 1 lb. ,,	13th Nov. 1911 30th Nov. 1911 30th Nov. 1911	3.02 inches Oct. 1911	8.19 inches Oct. 1912	11.96 inches Oct. 1913	5.17 inches	3.77 inches
13	No Manure			2.71 inches Oct. 1911	6.40 inches Oct. 1912	10.02 inches Oct. 1913	3.69 inches	3.62 inches

THE STANDARDISATION OF RUBBER PLANTATION v. HARD PARA.

By B. J. Eaton.

The recent heavy drop in the market price of raw rubber and more especially the greater disparity in price between the plantation product and Fine Hard Para, which is coincident with the general decline, has naturally been the cause of considerable interest, which has shown itself in the usual journalistic display of articles good, bad and indifferent, mostly the latter. The number of "experts" connected with the rubber industry is legion and the less their knowledge of the subject, the greater their dogmatism, reminding one of those well known Shakesperian lines "I am Sir Oracle, and when I speak, let no man ope his lips."

Whether the general fall in price is due to the increase in output of plantation product, I do not propose to offer a definite opinion, although I do not think that this can be so.

It certainly would appear however that the great difference in price between plantation rubber and the virgin product from Brazil, etc., is due to a difference, imaginary or otherwise on the part of the buyer, in the quality of the rubber for manufacturing purposes, in the case of a large portion of the plantation material.

Even in the case of one or two of the larger estates, whose rubber invariably obtains the highest market prices for plantation rubber, this disparity in price is considerable.

In view of the recent report issued by the Consulting Chemists of the Rubber Growers' Association and judging from my own experiments, which for various reasons are not sufficiently advanced to enable me to be dogmatic on the question, I consider that this difference in market price, between the highest quality of plantation smoked sheet and Fine Hard Para, is not justifiable.

There are several factors however which must tend to cause this difference in the market. In the first place the wild rubbers from South America are all well-known and tried brands and the arrangements for grading have been in force for years. Thus the following are some of the well known grades:—Fine Hard Para, Soft Fine Scrappy, Manaos, Cametas, Islands, Bolivian Fine, Peruvian Fine, Peruvian Ball, and Mollendo Fine. If the regular auctions be studied it will be seen that the difference in prices between the highest and lowest of these grades amounts to as much as 1/6 per lb.

The variation in quality in each of these particular grades is probably small, chiefly on account of the comparatively similar

manner in which each grade is prepared or obtained, and these variations are known to manufacturers as a matter of experience.

It will of course be said that plantation rubber is also graded, but while this is true for any particular estate, the variation in the quality between different estates is probably very great, owing to the treatment which the rubber undergoes, which admits of such variation in methods. One estate manager may say "I standardise my rubber"—but what is really required is uniformity of method on all estates for each grade.

It is this lack of uniformity of rubber from different estates which is probably the principal contributory cause to the difference of price, and it is bound for some considerable period to affect the price of even the best qualities of plantation smoked sheet.

Another contributory cause, as pointed out in my report on "Visits to factories in Europe," is the fact that the method of treatment of plantation rubber on the mixing rollers in the manufactory is probably not yet sufficiently understood by the operator, who, for years, may have been working with one definite mixing containing certain proportions of one or more grades of rubber. Although there is no doubt that much of the crepe rubber produced on estates in this country undergoes excessive rolling and mastication on the washing machines, many writers who complain of such drastic treatment of the rubber, have probably never visited a vulcanizing factory and seen the mastication on warm or hot rollers to which the raw rubber is subjected before vulcanisation, for this is so drastic that it destroys the nerve and elasticity of the raw material almost entirely and this is only regenerated after the vulcanizing process is completed. Of course, one has to remember that, in one case, we are dealing with freshly coagulated rubber which is very soft and in the other with more or less matured and hardened material, which may or may not have a different influence on the results.

In connection with the problem of rubber standardisation and the alleged inferiority of plantation Para rubber, an interesting report by Messrs. Clayton Beadle and Stevens, Consulting Chemists to the Rubber Growers' Association, has appeared recently in the India Rubber Journal, shewing the comparative results obtained in mechanical tests on samples of plantation and Wild Para rubber vulcanised under similar conditions and tested by them. From these results it would appear that the samples of plantation rubber mentioned in this report were equal to and often considerably superior to the samples of Hard Para, and that in all cases the samples passed the Admiralty test. (*N.B.* From most of the results given the Admiralty test would appear to be not sufficiently

stringent; at any rate there is a considerable margin between the figures obtained and those required by the Admiralty test).

Unfortunately however, the number of samples given in the report is very few and may represent only the quality of rubber which can be turned out by estates working on good lines.

Messrs. Beadle and Stevens have probably vulcanised and tested some hundreds of samples of plantation Para and it would have been interesting, had they either given figures for some of the poorer qualities or stated that a number (few or many) of samples gave lower values.

Their object, in this report, was, no doubt, to demonstrate, as they state, that plantation rubber should be accepted on its merits even if Fine Hard Para was specified in contracts, and their figures are satisfactory in this respect.

The manufacturer however probably realizes that, although there may be rubber from certain estates, which he can rely on using, yet he knows that much plantation rubber is very variable in quality, and it is this variability as much as the inferior quality which precludes its use for the highest qualities of manufactured goods. As stated in my recent report on "Visits to Rubber Factories," all the plantation crepe and unsmoked sheet in one large factory was mixed together and remade in order to produce a large batch of one quality—which could be subjected to a preliminary vulcanisation and test if necessary, instead of having a large number of small batches, each of which would have to be tested, and probably treated subsequently in a different manner in the factory. Variability is probably a more damaging factor in a batch of rubber than general inferiority, more especially in the case of a comparatively new product, such as plantation rubber, since, in the case of samples of wild Para rubbers, the different grades are well-known and the inferior grades can be easily selected by the buyer or manufacturer. On the other hand, unless a particular sample of plantation rubber is tacky or has some other obvious defect, it is exceedingly difficult and often impossible to detect differences of quality by appearance or any crude tests, such as hand-pulling, etc.

Probable Causes of Inferiority.

Considerable discussion has taken place recently with reference to the variety of Hevea tree cultivated in the Orient, but the conclusions arrived at are by no means definite.

In recent correspondence between the Director of the Royal Gardens, Kew (Col. Sir David Prain) the Director of Agriculture F. M. S. and Dr. C. J. J. Van Hall (Chief of Division of

Mycology) Buitenzorg, (Vide Agricultural Bulletin Vol. I, No. 77, p. 398) Sir David Prian makes the following pregnant remarks with reference to the statement by the Commission that the Orient seed was from an inferior variety. "It is to be presumed that whether it was or was not the intention of the parties making this statement to cause a certain amount of uneasiness among those interested in Eastern plantation rubber it would not be unpleasing to those interested in Brazilian rubber if the statement were correct."

Without any intention to be dogmatic, I do not think that this question of variety has any significance, as far as the quality of the rubber is concerned. Undoubtedly individual trees vary considerably in the amount of latex yielded and the rubber content of the latex. This variability in yield and rubber content of latex may be due to the age of the tree, excessive tapping, rainfall, soil, disease or to the individuality of the tree, that is to say, some physiological cause of unknown origin.

The principal cause of variability in plantation rubber is probably due almost entirely to the variation in the methods of coagulation and machining—the former including the dilution of the latex by the addition of water to the cups in collecting. One has only to visit a few estate factories to observe these variations in method. I am referring here particularly to the manufacture of crepe rubber, since more uniform and fairly standard methods must be adopted if plain or smoked sheet is made on an estate.

The editorial in the Malay Mail on the 18th September asks how many rubber growers are in possession of an absolutely correct formula for coagulating their latex, and the suggestion is made that the Agricultural Department might publish such a formula.

Such a formula and method can certainly be given to enable any estate to turn out a standard rubber, but the Department is certainly not yet in a position to state dogmatically, on the results of its own tests, that rubber prepared in this way will be equivalent to Fine Hard Para, and, till this can be stated with authority, I think it would be unwise to publish a formula, which might have to be altered subsequently.

As I have stated elsewhere, mechanical and other tests on raw rubber are unsatisfactory at present, and the only criterion is the vulcanised material. It is hoped that, as soon as the experimental vulcanising machinery has been erected and is in order, that tests on vulcanised samples prepared from rubbers coagulated and treated by various methods will indicate the differences be-

tween various grades of plantation rubber and between plantation rubber and Fine Hard Para, and will enable us to arrive at a standard method of preparing a rubber equivalent or superior to the latter. I would point out however, that already Messrs. Beadle and Stevens for the R. G. A. have issued a report (mentioned above) showing that the best qualities of plantation rubber are equal to and often superior to Fine Hard Para, but this report does not appear to have been accepted altogether by at least one of the leading rubber factories in Great Britain, and it certainly has not affected the price of plantation rubber from even one estate. Such an attitude of course may be anticipated, even if the results of these investigations are correct, as conclusions from scientific experiments often suffer the fate of other discoveries and may be only accepted after a considerable period.

A Universal Formula.

The following formula for preparing a standard quality rubber may be given tentatively, provided the methods of collection etc. are adhered to.

Latex should be collected without the addition of any water to the cups. This is already done by several of the leading estates. (Some estates maintain that this gives a larger proportion of naturally coagulated lump, which means a smaller percentage of No. 1 Rubber from first quality latex. From my own observations, this is however not the case).

The pure latex is collected separately and the cup washings collected in another vessel.

(1). Smoked Sheet.

This is now recognised to be the highest quality of plantation rubber on the market. In order to make good smoked sheet of standard quality, the pure latex, after bringing to the factory, may be diluted with an equal part of water. (The pure latex from average trees 6-12 years old, will contain from 25 to 35 per cent. of dry rubber—depending on the tapping, rainfall, etc.) and the diluted latex should contain approximately 15 per cent. of dry rubber *i.e.* 1½ lbs. per gallon of latex. (*N.B.* If the pure latex is a little low in rubber content, less water can be added. An hydrometer, which must be accurately constructed and which is being still experimented with, should be used to ascertain the approximate rubber content of the latex. It is hoped shortly to have an instrument graduated in direct rubber content).

The amount of acetic acid of 5 per cent. strength (1 in 20) recommended for the coagulation of one gallon of this latex is

2 ozs. To obtain a sheet having a good surface appearance—free from oxidation marks, a small quantity of sodium bisulphite may be used,—about ½ oz. of a 5% solution per gallon of latex. This should be mixed with the latex immediately before the acid is added.

To ensure sheets of uniform thickness, the latex should be coagulated in bulk—about 40 to 50 gallons at a time, in a large fairly deep vessel. The acid should be thoroughly mixed with the latex by means of a paddle operated by hand. There will be sufficient time to pour this latex into the coagulating troughs or pans before coagulation sets in. Each pan or trough should be filled to the top and the surface scum removed by a thin piece of wood or other contrivance. Coagulating pans holding about 1 gallon or long troughs divided up by means of movable partitions may be used, so that each sheet of rubber weighs approximately 1½ lbs. when dry. The sheets should be machined on the following day after coagulation, and hung for a few hours or overnight to drain, and then placed in a two-storey smoke house and smoked for about 10 days or a fortnight, so that an even lot of rubber is produced. Coconut husks form very suitable fuel for smoking, but further experiments are necessary with other fuel.

The temperature of the smoke house in which the rubber is hung should not exceed 110° F. and smoking should be carried on preferably only at night, to avoid the excessive heat during the day.

The sheet should be passed only once or twice through plain even speed rollers, after previous hand rolling to make the rubber firmer for handling, then once through a diamond marker, which may be an ordinary creping machine with diamond grooves.

(2). Crepe.

At present the market demand in this respect, is for pale thin crepe.

For preparing this, the latex should be collected as before and diluted in the factory to the same extent and treated with sodium bisulphite and acetic acid in bulk. In order to obtain a very pale crepe, it is necessary to add more than the quantity of Sodium bisulphite given above, and this may have to be ascertained by experiment on different estates, as latex varies in its oxidisability. The usual quantity found to be sufficient is 2 ozs. of a 5% solution per gallon of latex. The small variation necessary in the amount of Sodium bisulphite probably has no effect on the resultant rubber. The coagulated lump of rubber should be left in the coagulating jar overnight and machined next morning. At present it is difficult to give any precise recommendations re machining, but the rubber should be put through the machines the minimum

number of times necessary to produce a crepe of good finished appearance.

On one estate, the rubber is passed eight times through the machines. It is preferable, when possible, to have, say three machines, each gauged differently, so that the gauge of each machine is kept constant and each sample of rubber can be passed the same number of times through each machine. In this way exactly similar treatment will be given to each sample.

Concluding Remarks.

A later editorial of the Malay Mail has suggested the inauguration of Test-houses for rubber in various towns, such as Singapore, Penang and Kuala Lumpur, by which is meant, presumably, Testing Stations, such as that shortly being started by this Department.

The idea is an excellent one, but somewhat premature I think, considering the amount of preliminary experimenting which will be necessary before we are in a position to issue guarantees for rubber shipped from this country, and to see how such a proposition works in practice.

I think the amount of work and the comparative slowness of research work of this or any other scientific nature is not sufficiently realized by the layman, if I may use such a term.

The results published show only the successes and not the failures or the many negative results which are obtained in the course of an investigation in endeavouring to reach the goal.

The publication of leaflets on methods of preparation etc. is excellent in its way, but I find that much more satisfactory results can be accomplished by personal visits to estates. Considering the fact however, that there are upwards of 500 estates in this country—apart from small native holdings and that it would be necessary to spend at least a day at the factory on each estate and perhaps some time in the field, it will be seen that any one estate could only be visited once in about two years. With the increase in staff of the chemical laboratory of the Agricultural Department it will be possible to accomplish this work satisfactorily, but hitherto this has not been possible; the actual period of work devoted entirely to rubber research has amounted to about six months, only sufficient to carry out preliminary work, such as was published in the Bulletin on "The Preparation of Para rubber."

These remarks are added for the benefit of those who do not realize the amount and nature of the work to be carried out, before satisfactory recommendations can be made. There is no royal

road, no Elixir of Life, no Philosopher's Stone; these were but dreams or fantasies of the alchemist of old, unsupported by fact and speculative in their nature, but by patient prolonged research involving many failures which never appear, we shall doubtless be able to arrive at the actual cause, in the case of plantation rubber, of its present defects and to apply an Elixir based on the knowledge gained and supported by facts.

MINUTES OF MEETING OF THE PLANTER'S ASSOCIATION OF MALAYA.

Held on October 5th, 1913, at Kuala Lumpur.

Present: Mr. R. W. Munro (Chairman); The Hon. Mr. G. H. Day (Legal Adviser); Mr. H. C. E. Zacharias (Secretary). and the following delegates from Constituent Associations:—

Mr. J. Milne Counsel	Bagan Datoh Planters' Association.	
,, H. E. Darby	Batang Padang	,,
,, E. Dane	Batang Padang	,,
,, W. N. Gawler	Johore	,,
,, J. Bruce	Johore	,,
,, C. Burn-Murdoch	Kajang District	,,
,, P. F. Wise	Kajang District	,,
,, G. H. King-Harman	Kapar District	,,
,, E. W. Harvey	Kapar District	,,
,, E. B. Prior	Klang District	,,
,, G. C. Ash	K. Lan. ,,	,,
,, F. Clyde-Jeavons	K. Lum ,,	,,
,, A. J. Fox	K. Lum ,,	,,
,, W. E. L. Shand by proxy Mr. A. B. Slee	K. Sel. ,,	,,
,, J. W. Campbell	Malacca ,,	,,
,, H. M. Darby	Malacca ,,	,,
,, F. W. Collins	Malacca ,,	,,
,, V. A. Tayler	N. Sem. ,,	,,
,, P. W. N. Farquharson	N. Sem. ,,	,,
,, W. de L. Brooke	U. Sel. ,,	,,
,, E. Granville-Smith	U. Sel. ,,	,,

Honorary Members:—Mr. L. Lewton-Brain, Director of Agriculture, F. M. S.; Mr. E. S. Hose, Ag. Controller of Labour, F. M. S.

Visitors:—Mr. H. C. Pratt, Entomologist, F. M. S.; Mr. G. F. Richardson.

AGENDA.

(1). The Minutes of the Meeting held on July 13th on the proposition of Major Fox seconded by Mr. King-Harman are taken as read and confirmed.

2. LONDON RUBBER EXHIBITION (1914).

The following correspondence was read:—

(1). A letter from the Secretary to Mr. C. Baxendale informing him of the circularisation of estate managers re contributions, and Mr. Baxendale's reply.

(2). Correspondence of a similar nature from Mr. C. Malcolm Cumming and Mr. A. Staines-Manders (organiser of the Exhibition) urging the importance of representation by the F. M. S. at this Exhibition. Similar correspondence between the Secretary P. A. M. and the Secretary R. G. A.

(3). Correspondence from the Secretary Planters' Association of Ceylon stating that Ceylon would be represented and enquiring re attitude of the P. A. M., together with the reply of the Secretary P. A. M. informing him of the action taken by the P. A. M.

(4). A letter from Sir Henry Blake (President Rubber Exhibition) asking the P. A. M. to appoint delegates to the Exhibition and for papers on subjects of interest connected with the industry.

It was resolved to let the question of delegates stand over, till plans of members going on leave in 1914 were known.

The Secretary reports that replies to his circulars were coming in, mostly satisfactory.

3. BATAVIA CONGRESS AND RUBBER EXHIBITION.

The following correspondence is summarised in connection with the above.

(1). A letter from the Secretary P. A. M. to the Under Secretary F. M. S. stating that the Association saw little object in sending exhibits but considered that this country should be well represented and suggesting that Government should join with the Association in sending over a strong commission to attend the Exhibition and Congress.

A reply was received from the Under Secretary to the effect that the Government proposes to send Mr. L. Lewton-Brain (Director of Agriculture), Mr. B. J. Eaton (Agricultural Chemist), and possibly another officer as delegates.

A further letter from the Secretary P. A. M. thanking the Under Secretary for the information given and stating that the P. A. M. would be officially represented by delegates.

Discussion:—Mr. Munro is in favour of Malaya being represented by exhibits as well as delegates.

Mr. H. M. Darby proposes the following sub-Committee:—Messrs. R. W. Munro, E. B. Skinner and L. Lewton-Brain, to whom all arrangements in connection with this matter should be referred. This proposal was seconded by Mr. Campbell and carried.

4. Repression of Drunkenness.

The Secretary reads correspondence of a similar nature addressed by him to the Colonial Secretary S. S., the Under Secretary F. M. S., and the Adviser to the Johore Government suggesting that the steps recently taken to reduce drunkenness amongst Indian labourers had not resulted in permanent improvement and that further control is necessary, submitting that it should be made an offence for any Indian labourer to possess, and for any person to sell or give any Indian labourer spirituous liquors of any description.

Formal acknowledgements were received from the last two and the Colonial Secretary S. S. wrote to the effect that the Colonial Government had the question of legislation under consideration.

5. Honorary Members.

The election of the Director of Gardens S. S. as an Honorary Member proposed by Mr. Prior and seconded by Mr. Darby was carried unanimously.

6. Education on Estates.

A letter from the Ag. Controller of Labour was read, to the effect that instruction must be given in the morning, but that school hours were reduced from three to two. Instructions for Tamil Vernacular Grant-in-aid Schools were also enclosed.

After discussion and remarks by the Ag. Controller of Labour Mr. Farquharson proposes that the Secretary write to the Ceylon Government asking for details as to the system in force on the island and enquiring whether the system had proved suitable. This was seconded by Mr. Slee and carried. The Secretary was also instructed to send copies of the Director of Education's "Instructions" to all Constituent Associations.

7. Rural Boards.

A letter from the Secretary P. A. M. to the Secretary R. G. A. was read informing the R. G. A. that "A special vote of thanks be accorded to the R. G. A. for their cooperation with the P. A. M.

in connection with the Labour Code. The reply of the Secretary R. G. A. was also read.

Correspondence from the Under Secretary F. M. S. to the Secretary P. A. M. and the Ag. Controller of Labour to the various Constituent Associations inviting them to appoint Committees which the Controller of Labour and other officers of the Labour Department will consult, connected with labour affecting such District Associations, the committees to be purely consultative and have no statutory powers. The officers of the Health Dept. are also to consult such Committees on matters of Estate sanitation.

The Secretary P. A. M. in his reply informed the Ag. Controller of Labour that owing to Mr. Macfadyen's absence in Burma, it was impossible for him and the Hon. Mr. E. B. Skinner as the Sub-Committee to submit a formal report in their consultations until his return.

Mr. Hose stated that he understood that more detailed proposals would be recommended by the Sub-Committee and asked that a report expressing the conclusions arrived at, might be considered and forwarded to him.

It was proposed by Mr. Fox, seconded by Mr. Burn-Murdoch and carried, that the Hon. Mr. E. B. Skinner be asked to prepare a report and submit to the Standing Committee.

8. Absconders.

Correspondence between the Secretary P. A. M. and the Under Secretary F. M. S. was read to the effect, that, under the Criminal Procedure Code, on the subject of warrants of arrest, these are generally applicable to the arrest of offenders punishable under "The Labour Code 1912."

2. Correspondence from the Secretary P. A. M. to the Colonial Secretary S. S. the Adviser to the Johore Government and the Under Secretary F. M. S. with reference to the losses and inconvenience caused by the fact that absconding was not an extradictable offence and asking that steps might be taken in this connection, was read, together with the replies.

The General Adviser to the Johore Government replied to the effect that action was being taken, which would, it was hoped within the next few months remove the difficulty and inconvenience.

The Colonial Secretary S. S. replied to the effect that the question had already been brought up by the Planters in Malacca, but that it has not been considered advisable to alter the law in this

respect. The Under Secretary replied to the effect that the subject was receiving attention.

At the suggestion of Mr. Campbell it was agreed that the attention of the Colonial Secretary S. S. be drawn to the action contemplated by the Johore Government.

9. Date of Payment of Wages.

A letter from the Under Secretary F. M. S. was read, to the effect that there did not appear to be sufficient justification for altering the law as at present in force, in respect of the date of payment of labourers' wages each month.

The Secretary P. A. M. in his reply sates that the Hon. E. B. Skinner proposes to promote a private bill on the subject for the consideration of the Federal Council at their next meeting, when it is hoped sufficient reasons will be adduced.

An acknowledgement of this letter by the Under Secretary F. M. S. was then read.

10. Indian Immigration Committee.

A letter from the Ag. Controller of Labour with reference to the free tickets from Madras to Penang or Port Swettenham issued by the Emigration officers in India, to *bona fide* Indian labourers who are desirous of seeking employment in the S. S. or F .M. S. was read.

The Controller recommends that employers engaging such labourers, who are given certificates by the Government Agent in India, should asked for such certificates and can, by forwarding these, with the quarterly returns required under Section 153 of the Labour Code, obtain credit for such labourers as imported labourers for the purpose of calculating the extra rate under Section 156 (b). No recruiting allowances however will be paid.

2. A second letter from the Controller of Labour was read, stating that the Immigration Committee had decided to defray from the Immigration Fund, in future, all expenses of detention in depots in India, including boat hire on embarkation, commencing from the next shipment after receipt of the letter.

Mr. Slee is of opinion that the local railway fares should also be defrayed from the Indian Immigration Fund and the Secretary is instructed to write to the Committee accordingly.

11. Newspaper Agitation.

The Secretary reports the receipt of the following Resolution from the Kuala Lumpur D. P. A. "That the P. A. M. take steps to counteract the press campaign now being conducted in India

against emigration to Malaya" and lays on the table the July 1913 number of the Indian Review.

After discussion, in which it was suggested that the Government might take action, a review of the campaign was given by Mr. Zacharias and some interesting observations on the subject and a suggestion was made by him that a Brahmin gentleman previously in charge of the Indian Census work under the Census Officer should visit and report on Indian Labour Conditions on Estates and should subsequently write to the Indian papers mentioned.

This was supported by Mr. Tayler and Mr. Darby stated that the P. A. M. should bear the expenses.

Mr. Munro proposed and Mr. Prior seconded that expenses not exceeding $150 be paid this gentleman to defray expenses.

The Hon. Mr. Day intimated that in his opinion an action for libel would lie.

Mr. Burn-Murdoch proposed and Mr. Fox seconded that the Chief Secretary be asked whether the question is actionable and if so, that the Indian Government be asked to take steps accordingly. This was carried.

12. Discharge Tickets.

The following resolution from the Negri Sembilan Planters' Association was read "That the Association heartily supports the proposal made by the Committee to enquire into the Ceylon system of Discharge Tickets, which was laid before the Federal Council and would urge the P. A. M. to use every effort to induce Government to accept and bring into effect the same.

After discussion it was decided that no steps be taken at present.

13. Reduction of Wages.

A letter from the Secretary Bagan Datoh Planters' Association was read on this subject, asking the P. A. M. to take the matter in hand:

The question was then formally submitted by Mr. H. E. Darby for discussion, and Mr. H. M. Darby informed the meeting of the action taken in Malacca.

Mr. Prior proposes and Mr. Granville-Smith seconds the proposal, that the Constituent Associations be called together and their views ascertained first; each Constituent Association to send two delegates, not necessarily planters, to form a Sub-Committee for framing a definite proposal.

This was agreed to, and the Secretary instructed accordingly.

14. Labour (Varia).

1. Mr. Tayler proposes that the substitution of the number "five" instead of "ten" be made in Section 40 of the Labour Code, to prevent small estates inducing recruited coolies to leave their present employers who had recruited them. Mr. Hose thought that the difficulty might be met by eliminating the words "on a place of employment in Section 66" and it was finally decided as proposed by Mr. Jeavons and seconded by Mr. Tayler that Government be addressed on the lines of Mr. Hose's suggestion.

2. Mr. Munro also took the opportunity of warning managers against refusing to accept notice from their coolies, as such an attitude was wrong and indefensible.

3. A letter from the Negri Sembilan Planters' Association to the Legal Adviser P. A. M. asking for information on Section 143 of the Labour Code was read in connection with a particular case.

A letter from the Ag. Controller of Labour to the Secretary P. A. M. on the same subject was read in which the Controller states that under the section he had no option as to taking proceedings against the manager.

4. The Legal Adviser also suggested in connection with another case, that each estate pay a minimum by way of "wages" and give a "bonus" for special work, such as tapping.

5. A letter to the Secretary P. A. M. from the Batang Padang D. P. A. asking for legal advice with reference to charges against Watchmen under any Enactments, for neglect of or absence from duty.

The Legal Adviser P. A. M. suggested that such cases could be dealt with, under the Labour Code, by inserting in the second line of the definition of "Labour," after the word "employed," the words "as a watchman on an Estate."

6. A letter from the Malacca P. A. to the Ag. Controller of Labour with reference to the engagement of coolies transferred from estates owing to reduction of wages was read, in which it was suggested that the enactment be altered to allow such transferred labourers to be assessed at Coast Recruited rates or exemption from the extra assessment levied on locally recruited labour.

Mr. Slee also mentions the anomalous position of the Bernam district and gives notice to bring up a motion at the next P. A. M. meeting.

Mr. H. M. Darby proposes "that in the interests of the planting community and of this Association, the F. M. S. Labour Code be introduced into the S. S. as proposed with the least possible delay."

This was seconded by Mr. Campbell and carried and the Secretary instructed to address the Colonial Secretary S. S. accordingly.

15. Javanese Labour.

Correspondence between Messrs. Mansfield and Co., the Secretary for Chinese Affairs and the Secretary P. A. M. with reference to the crimping of Javanese labourers recruited by estates in this country from Java was read. The Colonial Secretary S. S. informs the Secretary P. A. M. that contracts of Javanese Labourers for places outside the Colony and the F. M. S. hitherto signed at the Chinese Secretariat, Singapore, will cease to be ratified after November 1st. The signing of such contracts was considered by the P. A. M. and Messrs. Mansfield & Co., as a direct incentive to crimping by places outside the Colony and F. M. S.

16. Rubber Dealers Licences.

Correspondence between the Secretary P. A. M. and the Colonial Secretary S. S. on the issue of licences to Rubber Dealers was then read.

The Colonial Secretary states that, with a view of giving interested persons an opportunity of showing cause why applicants should not be granted licences, it is proposed to arrange for the publication of lists of applicants for renewals before the expiry of their existing licences.

17. Agricultural Pests.

The locusts problem was discussed by the Meeting which considers that the steps hitherto taken by the Agricultural Department are inadequate.

The following resolution proposed by Mr. Campbell and seconded by Mr. Farquharson was agreed to " That this Association views with alarm the rapid spread of locusts in the country and is of opinion that the present steps taken for their eradication are inadequate.

Mr. Counsel referred to the damage caused by rats in the Bagan Datoh district.

Mr. Tayler considered that excellent work in the destruction of locusts had been carried out by the Agri. Dept. in the Seremban district.

Mr. Day also informs members, that under the new Pests Enactment, they may eradicate locusts on their land and recover the costs incurred from Government.

A description of the apparatus being used was also given.

18. Freight on Rubber.

As it was considered that, especially in view of the low price of the commodity, the present freight on rubber was too high, the Secretary read correspondence which had passed between him and the R. G. A. with reference to a combined remonstrance against the Shipping Conference.

The Secretary R. G. A. forwarded correspondence which showed that the Shipping Conference was not prepared to consider a reduction in freight.

19. Agricultural Bulletin.

A statement regarding the cost of the bulletin was submitted.

20. Export Duty.

A proposal from Mr. Macfadyean "that the rubber duty could be more conveniently collected if all grades were treated as of the same value, such value to correspond to the mean average price of the various grades at the time," was unsupported.

21. Quit Rent.

A motion intended to be brought forward by Mr. Macfadyen, was dropped, owing to his absence. Mr. H. M. Darby informed the Association that the Malacca P. A. had already approached their Government with reference to a reduction.

22. Agricultural Department.

The Secretary reads a letter from Secretary Malacca P. A. requesting the Association to approach Government with a view to extending the activities of the Agricultural Department to the Colony.

Mr. Campbell proposes and Mr. H. M. Darby seconds the motion, that the Association endorses the action taken. This was carried, and the Secretary is instructed to address the Colonial Secretary S. S. accordingly.

23. Post Office.

Correspondence between the Secretary P. A. M. and the Director Posts and Telegraphs re non-delivery of letters to Tamil coolies on Estates owing to incomplete or vague addresses was read.

The Director Posts and Telegraphs suggests that members of the Association supply their coolies with writing paper bearing the name of the Estate in Tamil.

24. Standardization of Rubber.

A letter from Mr. Baxendale with reference to the stamping of crepe rubber was read which stated that the question was being considered by the Standardization Committee of the R. G. A.

A letter from Messrs. Aylesbury and Garland was also read, deprecating the use of Copper rollers in washing machines etc., owing to the well-known deteriorating effect of copper salts on rubber.

25. Day of Meetings.

Mr. Jeavons gives notice that he will propose that in future, meetings be held on Saturday instead of Sunday Morning.

The Meeting terminates at 4 p.m.

ULU SELANGOR DISTRICT PLANTERS' ASSOCIATION.

A general meeting of this association was held at the Kuala Kubu Rest House at 9.30 a.m. on Friday October 24th, 1913.

The following were present. Mr. W. De L Brooke Chairman: Mr. E. Granville Smith, Hon. Sec.; Messrs. M. J. Kennaway, G. P. Mackilligin, N. H. Dakeyne, W. A. Henderson, L. W. Weddigie, G. R. Wake, F. S. Lyne, R. M. Newton.

The following business was discussed.

Minutes of the last meeting were passed.

Telephones. The Hon. Sec. read out certain letters which tended to show that no apparent signs of further immediate progress were being given by Government to further the scheme.

It was therefore proposed by Mr. Lyne and seconded by Mr. Newton "That a letter be sent to the Chief Secretary asking him to further the scheme and that a copy of this letter be also sent to the Hon. Mr. Skinner as unofficial member." Carried *Nem. Con.*

Wages. Mr. Granville Smith was able to give the meeting the results of his enquiries as to the rates ruling on different estates in this association.

After some interesting discussion the following resolutions were finally passed:—

A. Proposed by Mr. Lyne and seconded by Mr. Brooke: "That on and after December first, 1913, the maximum rate for field work be fixed at thirty five cents per diem for Tamils and fifty cents per diem for Malays and Javanese.

B. Proposed by Mr. Wake and seconded by Mr. Dakeyne: "That on and after December first, 1913, the maximum rate for field work be fixed at sixty cents per diem for Chinese."

C. Proposed by Mr. Kennaway and seconded by Mr. Henderson: "That a copy of this resolution be sent to every member of this association and also to certain other Tamil and Chinese Planters in this district, who are not members, for their guidance."

Delegates. Proposed by Mr. Brooke and seconded by Mr. Wake: "That Mr. Newton and Mr. Granville Smith be elected as delegates to act on the special committee for considering some scheme for universal reduction of wages throughout the F. M. S. and Straits Settlements." Carried unanimously.

Locusts. A letter from the Director of Agriculture was read asking for assistance from planters with regard to (1) Labour, (2) Accommodation for Labour, and (3) information as to the locality of locust swarms.

Mr. Newton proposed and Mr. Lyne seconded: "That we are prepared to render all the assistance that we can and that a list of members of this association and their addresses be sent to the Director of Agriculture for his information." Carried unanimously.

Rates for Recruiting and Railway Freight.

Mr. Granville Smith pointed out that some of the charges in connection with recruiting were very heavy and in particular pointed out the following details:—

That Messrs. Boustead Hampshire's bills included amongst others
- A charge of 10 cents per meal for coolies
- Also an agency charge of 50 cents per coolie.

That Messrs. Madura Company bills included amongst others
- Boat hire at Negapatam Rs. /4/- per coolie
- Boat hire at Port Swettenham /3/- per coolie making a total charge for boat hire of Rs. /7/- per coolie
- Supervision charges /8/- per coolie
- Commission on expenditure of 5%
- Further the dieting charges on his last three bills paid averaged out at Rs. 1/7/5 per head.

He further pointed out that Railway charges on rubber consignments over a distance of about 70 miles worked out at more than the shipping charges for about 10,000 miles and these latter were considered unreasonably high.

Mr. Kennaway proposed and Mr. Weddigie seconded: "That these points be brought up at our next meeting when members can come, prepared with information on the subject." Carried unanimously.

Thee meeting closed with a vote of thanks to the chair.

DEPARTMENT NOTE.

Mr. J. G. Watson, Superintendent, Government Plantations, Selangor and Negri Sembilan has been transferred to Forest Department as Assistant Conservator of Forest, Kuantan, Pahang on the 10th October, 1913.

FEDERATED MALAY STATES.

Comparative Statement of Cultivated Rubber Exported, with Value and Duty Collected Thereon, during the Years 1913 and 1912.

Destination.	Exported during September, 1913.	Previously.	Total export during the year.	Export during similar period of previous year.	Increase.	Decrease.	Value of rubber, 1913, to date.	Duty collected, 1913, to date.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	$	$ c.
Straits Settlements ...	1,009.47	6,395.11	7,404.58	4,458.03	2,946.55	...	20,184,421	502,040.39
United Kingdom ...	853.99	6,905.07	7,759.06	5,524.38	2,234.68	...	21,441,753	536,043.75
Continent of Europe ...	93.05	920.81	1,013.86	749.48	264.38	...	2,814,156	70,353.75
Ceylon	43.51	406.75	450.26	285.24	165.02	...	1,268,804	31,720.00
Other Countries ...	...	...	...	10.45	...	10.45	...	...
Total ...	2,000.02	14,627.74	16,627.76	11,027.58	5,610.63	10.45	45,709,134	1,140,157.89

KUALA LUMPUR,
8th October, 1913.

W. J. P. HUME,
Commissioner, Trade and Customs, F.M.S.

Abstract of Meteorological Readings in the various Districts of Malaya for the Month of September, 1913.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bahru	...	146.	81.3	91.	73.83	17.17	77.8	.883	75.5	.80%	...	9.40	1.77
Malacca, Durian Daun Hos.	29.876	145.7	81.2	85.7	71.2	14 5	78.5	.938	...	.88	N. W.	15.43	3.22
N. Sembilan, Dist. Hospital Seremban	...	150.8	78.6	90.3	70.8	19.5	75.3	.816	73.	82	N. W.	10.61	2.35
,, Dist. Hos. K. Pilah	...	152.9	79.0	...	.	...	76.2	.850	74.3	.85	..	4.51	1.20
,, ,, Tampin	...	155.	78.8	87.	72.6	14.4	75.2	.805	73.	.80	...	12.62	3.00
,, ,, P. Dickson	...	154.5	81.5	87.7	74.	13.7	77.2	.851	74.3	.79	...	7.50	1.87
Pahang, ,, K. Lipis	...	...	80.2	89.2	68.7	20.5	74.9	...	...	...	...	10.35	2.42
Penang, ,, Penang	29.817	137.1	80.7	86.6	72.7	13.9	77.	.872	74.5	.84	...	22.86	4.10
Perak, ,, Taiping	...	106.	82.43	94.	71.	23.	76.95	.854	...	.78	...	11.24	2.25
,, ,, Ipoh	...	...	81.92	92.	70.	22.	76.32	.833	...	.77	...	4.87	.91
,, ,, T. Anson	...	...	82.23	92.	68.	24.	78.04	.905	...	.83	...	6.32	1.70
,, ,, P. Buntar	...	...	80.76	92.	72.	20.	75.57	.816	...	.78	...	9.79	2.32
,, The Cottage	...	...	...	..	...	...	...	...	...	...	...	27.46	3.75
Selangor, General Hospital Kuala Lumpur	...	145.9	82.	89.3	74.8	14 5	78.3	.902	75.9	.82	...	5.27	1.05
,, Dist. Hos. Klang	..	...	81.	87.1	73.3	13.8	75.9	...	...	...	...	6.65	1.90
,, ,, K. Selangor	...	...	...	88.2	72.4	15.8	...	...	...	...	...	4.09	1.50
,, ,, Rawang	...	...	...	91.2	71.7	19.5	...	...	...	...	...	7.13	1.75
Singapore, Kandang Kerbau Observatory	29.911	160.	82.2	92.4	72.	20.4	77.5	.876	..	.81	...	8.84	1.93